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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of	:	**BOX PATENT APPLICATION**
Eric LENGLET et al.	:	Examiner: Unassigned
Serial No.: Unassigned	:	Group Art Unit: Unassigned
Filed: Herewith	:	

For: PROCESS AND DEVICE FOR PRODUCTION OF ELECTRICITY IN A FUEL CELL BY OXIDATION OF HYDROCARBONS FOLLOWED BY A FILTRATION OF PARTICLES

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to examination, Applicants wish to amend the above-identified application as indicated below:

IN THE CLAIMS:

Please amend the claims as follows:

1. (Amended) A process for the production of electricity in a fuel cell from hydrocarbons, comprising a partial oxygenation stage of hydrocarbons, said process comprising

a) providing a stream (1) containing a hydrocarbon feedstock having boiling points less than about 400°C,

b) preheating said stream to a temperature of at least 200°C, so that said stream is entirely evaporated to form a hydrocarbon gaseous stream,

c) preheating an air-carrying gaseous oxidant stream (2) to a temperature of at least 400°C,

d) reacting the hydrocarbon gaseous stream with the preheated air-carrying gaseous stream in a partial oxidation zone (3) or chamber, under operating conditions in the following ranges:

(i) dwell time in the chamber of between 100 and 1200 milliseconds,

(ii) output temperature of the chamber of between 1150 and 1650°C,

(iii) pressure of the chamber of between 0.1 and 1.5 MPa,

and so that the output temperature of the chamber is adequate to convert at least 90% of the carbon of the feedstock into CO or CO2 and that the amount of soot contained in the effluent is less than 0.1% by weight relative to the feedstock,

e) cooling the effluent of the chamber is cooled (5) to a temperature of between 200°C and 1050°C,

f) circulating the cooled effluent in at least one zone for recovery of hydrogen and treatment of soot, said zone comprising a first circuit (6) at least a first filter (7) and a second circuit (41) mounted in parallel; depositing soot in the first filter; regenerating the first filter containing the soot in the presence of a gas that contains oxygen, and concurrently circulating the cooled effluent the second circuit, said first filter having a filtration surface area/useful volume ratio between 80 and 5000 m^{-1}, and withdrawing a hydrogen-rich effluent from said at least one zone for recovery, and

g) feeding a fuel cell (10) with at least a portion of the withdrawn hydrogen-rich effluent from the recovery zone.

5. (Amended) A process according to claim 1, wherein regeneration effluents of the first filter are drawn off from the first circuit.

6. (Amended) A process according to claim 1, wherein the gaseous oxidant stream and/or the hydrocarbon feedstock contains water vapor in an H2O/hydrocarbon mass ratio of between 0.1 and 2.0.

7. (Amended) A process according to claim 1, further comprising measuring, the oxygen content of the effluent that exits the recovery zone.

8. (Amended) A process according to claim 1, further comprising conducting at least one at least partial elimination stage of the hydrogen sulfide and carbon monoxide of the effluent that is obtained from the recovery zone.

9. (Amended) A process according to claim 1, wherein the fuel cell is an electrolyte-type cell with solid oxide (SOFC).

10. (Amended) A process according to claim 1, wherein the fuel cell is a polymer electrolyte cell (PEMFC type) or a phosphoric acid cell.

11. (Amended) A process according to claim 1, further comprising adjusting the operating conditions of the partial oxidation zone during the regeneration periods of the first filter to reduce the amount of soot produced during said periods and circulating in the second circuit.

12. (Amended) A device for the production of electricity according to claim 1, comprising in combination:

a circuit (1) for feeding an air-rich oxidant stream that is connected to at least one heat exchanger (5) for the reheating of said stream,

at least one partial oxidation chamber that is connected to heat exchanger (5) and to a feed stream (2) of a hydrocarbon-rich stream for the partial oxidation of hydrocarbons for the reheated oxidant stream at an adequate temperature for obtaining a conversion of the hydrocarbons that is higher than 90% and the formation of soot in an amount that is less than 0.1% by weight relative to the hydrocarbons,

partial oxidation chamber (3) that is connected downstream to the exchanger,

soot recovery and treatment means that have an inlet connected to heat exchanger (5) and that comprise a first circuit (6) that comprises at least a first filter (7) and a second circuit (41) that are mounted in parallel, whereby the first filter also comprises regeneration means (20, 21) that are sequential by soot combustion, whereby the first filter has a filtration surface area/useful volume ratio of between 80 and 5000 m^{-1}, and whereby the recovery and treatment means have an outlet (9) for effluents from which soot has been removed and that are rich in hydrogen,

at least one fuel cell that is connected to the outlet of the effluents of the recovery and treatment means, suitable for producing electricity,

means for alternating use of soot recovery and treatment means (30, 31, 32, 35) that are connected to regeneration means of first filter (20, 21).

14. (Amended) A device according to claim 12, wherein the second circuit comprises a soot filter.

15. (Amended) A device according to claim 12, further comprising, means (50, 51, 52, 53) for clean-up of effluents inserted between the outlet of the soot recovery and treatment means and fuel cell (10).

Please add the following new claims:

--16. A process according to claim 1, wherein the operating pressure of the chamber is between 0.15 and 0.8 MPa, the amount of soot in the effluent is between 0.5 and 100 ppm, and the effluent is cooled to between 500 and 900°C.

17. A process according to claim 6, wherein the H_2O/hydrocarbon mass ratio is between 0.4 and 1.2.

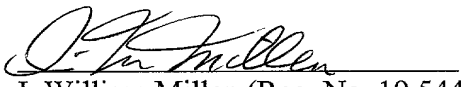
18. Apparatus according to claim 12, wherein the first filter has a filtration surface area/useful volume ratio of between 150 and 1500^{m-1}.--

REMARKS

A principal purpose of this Preliminary Amendment is to remove the multiply dependent claims and avoid the fee associated therewith, applicant reserving the right to reintroduce claims to canceled combined subject matter.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "**Version With Markings To Show Changes Made**".

Respectfully submitted,



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Version With Markings To Show Changes Made

In the Claims

The claims have been amended as follows:

1. (Amended) ~~Process~~ A process for the production of electricity in a fuel cell from hydrocarbons ~~that comprise~~ , comprising a partial oxygenation stage of hydrocarbons, ~~characterized in that~~ said process comprising

a) ~~A~~ providing a stream (1) ~~that contains~~ containing a hydrocarbon feedstock ~~with~~ having boiling points ~~that are~~ less than about 400°C, ~~is fed~~

b) ~~The~~ preheating said stream ~~is preheated~~ to a temperature of at least 200°C, ~~enough~~ so that said stream is entirely evaporated to form a hydrocarbon gaseous stream,

c) ~~An~~ preheating an air-carrying gaseous oxidant stream (2) ~~is fed, and the oxidant stream is preheated~~ to a temperature of at least 400°C,

d) ~~The two gaseous streams are reacted~~ reacting the hydrocarbon gaseous stream with the preheated air-carrying gaseous stream in a partial oxidation zone (3) or chamber, ~~whereby the~~ under operating conditions ~~of this chamber are~~ in the following ranges:

~~-~~(i) ~~Dwell~~ dwell time in the chamber of between 100 and 1200 milliseconds

~~-~~(ii) ~~Output~~ output temperature of the chamber of between 1150 and 1650°C

~~-~~(iii) ~~Pressure~~ pressure of the chamber of between 0.1 and 1.5 MPa, ~~and preferably 0.15 MPa to 0.8 MPa~~

~~whereby~~ and so that the output temperature of the chamber is adequate ~~so that~~ to convert at least 90% of the carbon of the feedstock ~~is converted~~ into CO or CO2 and that the amount of soot contained in the effluent is less than 0.1% by weight relative to the feedstock, ~~preferably between 0.5 ppm and 100 ppm (1 ppm = 1 part per million)~~

e) ~~The~~ cooling the effluent of the chamber is cooled (5) to a temperature of between 200°C and 1050°C, ~~and preferably between 500°C and 900°C~~

f) ~~The~~ circulating the cooled effluent ~~is circulated~~ in at least one zone for recovery of hydrogen and treatment of soot ~~that comprises~~ , said zone comprising a first circuit (6) ~~comprising~~ at least a first filter (7) and a second circuit (41) ~~that are~~ mounted in parallel; ~~a stage for filtration of the effluent~~ depositing soot in the first filter ~~is carried out for a period of time in order to deposit soot there~~; regenerating the first filter containing the soot ~~is regenerated~~ in the presence of a gas that contains oxygen ~~for another period of time~~, and ~~during said other period of time,~~ concurrently circulating the cooled effluent ~~is circulated in~~ the second circuit, ~~whereby~~ said first filter ~~has~~ having a ~~high density such that the~~ filtration surface area/useful volume ratio

~~is~~ between 80 and 5000 m^{-1}, and withdrawing a hydrogen-rich effluent ~~that is~~ from said at least one zone for ~~exiting the~~ recovery ~~zone is recovered~~ , and

g) ~~A~~ feeding a fuel cell (10) ~~is fed by~~ with at least a portion of the withdrawn hydrogen-rich effluent ~~that is exiting~~ from the recovery zone.

5. (Amended) ~~Process~~ A process according to ~~one of claims 1 to 4~~ claim 1, wherein regeneration effluents of the first filter are drawn off from the first circuit.

6. (Amended) ~~Process~~ A process according to ~~one of claims 1 to 5~~ claim 1, wherein the gaseous oxidant stream and/or the hydrocarbon feedstock contains water vapor in an H2O/hydrocarbon mass ratio of between 0.1 and 2.0~~, preferably of between 0.4 and 1.2~~.

7. (Amended) ~~Process~~ A process according to ~~one of claims 1 to 6, wherein~~ claim 1, further comprising measuring, the oxygen content of the effluent that exits the recovery zone ~~is measured~~.

8. (Amended) ~~Process~~ A process according to ~~one of claims 1 to 7, wherein~~ claim 1, further comprising conducting at least one at least partial elimination stage of the hydrogen sulfide and carbon monoxide of the effluent that is obtained from the recovery zone ~~is carried out~~.

9. (Amended) ~~Process~~ A process according to ~~one of claims 1 to 7~~ claim 1, wherein the fuel cell is an electrolyte-type cell with solid oxide (SOFC).

10. (Amended) ~~Process~~ A process according to ~~one of claims 1 to 8~~ claim 1, wherein the fuel cell is a polymer electrolyte cell (PEMFC type) or a phosphoric acid cell.

11. (Amended) ~~Process~~ A process according to ~~one of claims 1 to 10, wherein~~ claim 1, further comprising adjusting the operating conditions of the partial oxidation zone ~~are modified~~ during the regeneration periods of the first filter to reduce the amount of soot produced during said periods and circulating in the second circuit.

12. (Amended) ~~Device~~ A device for the production of electricity according to ~~one of claims 1 to 11 that comprises~~ claim 1, comprising in combination:

= ~~A~~ a circuit (1) for feeding an air-rich oxidant stream that is connected to at least one heat exchanger (5) for the reheating of said stream,

= ~~At~~ at least one partial oxidation chamber that is connected to heat exchanger (5) and to a feed stream (2) of a hydrocarbon-rich stream for the partial oxidation of hydrocarbons for the reheated oxidant stream at an adequate temperature for obtaining a conversion of the hydrocarbons that is higher than 90% and the formation of soot in an amount that is less than 0.1% by weight relative to the hydrocarbons,

= ~~Partial~~ partial oxidation chamber (3) that is connected downstream to the exchanger,

= ~~Soot~~ soot recovery and treatment means that have an inlet connected to heat exchanger, (5) and that comprise a first circuit (6) that comprises at least a first filter (7) and a second circuit (41) that are mounted in parallel, whereby the first filter also comprises regeneration means (20, 21) that are sequential by soot combustion, whereby the first filter has a filtration surface area/useful volume ratio of between 80 and 5000 m^{-1} ~~and preferably between 150 and 1500 m^{-1}~~, and whereby the recovery and treatment means have an outlet (9) for effluents from which soot has been removed and that are rich in hydrogen,

= ~~At~~ at least one fuel cell that is connected to the outlet of the effluents of the recovery and treatment means, suitable for producing electricity,

= ~~Means~~ means for alternating use of soot recovery and treatment means (30, 31, 32, 35) that are connected to regeneration means of first filter (20, 21).

14. (Amended) ~~Device~~ A device according to ~~one of claims 12 to 13~~ claim 12, wherein the second circuit comprises a soot filter.

15. (Amended) ~~Device~~ A device according to ~~one of claims 12 to 14 wherein~~ claim 12, further comprising, means (50, 51, 52, 53) for clean-up of effluents ~~are~~ inserted between the outlet of the soot recovery and treatment means and fuel cell (10).

Claims 16-17 have been added.